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- 38 [6,161,130](#)  [Technique which utilizes a probabilistic classifier to detect "junk" e-mail by automatically updating a training and re-training the classifier based on the updated training set](#)
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- 40 [6,128,608](#)  [Enhancing knowledge discovery using multiple support vector machines](#)
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- 42 [6,031,935](#)  [Method and apparatus for segmenting images using constant-time deformable contours](#)
- 43 [6,004,267](#)  [Method for diagnosing and staging prostate cancer](#)
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### 1 [Attention and integration: Learning and reasoning about interruption](#)

Eric Horvitz, Johnson Apacible

November 2003 **Proceedings of the 5th international conference on Multimodal interfaces**Full text available: [pdf\(1.07 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present methods for inferring the cost of interrupting users based on multiple streams of events including information generated by interactions with computing devices, visual and acoustical analyses, and data drawn from online calendars. Following a review of prior work on techniques for deliberating about the cost of interruption associated with notifications, we introduce methods for learning models from data that can be used to compute the expected cost of interruption for a user. We desc ...

**Keywords:** cognitive models, divided attention, interruption, notifications

### 2 [Exact Bayesian Structure Discovery in Bayesian Networks](#)

Mikko Koivisto, Kismat Sood

August 2004 **The Journal of Machine Learning Research**, Volume 5Full text available: [pdf\(261.89 KB\)](#)Additional Information: [full citation](#), [abstract](#), [index terms](#)

Learning a Bayesian network structure from data is a well-motivated but computationally hard task. We present an algorithm that computes the exact posterior probability of a subnetwork, e.g., a directed edge; a modified version of the algorithm finds one of the most probable network structures. This algorithm runs in time  $O(n 2^n + n^{k+1}C(m))$ , where  $n$  is the number of network variables,  $k$  is a constant maximum in- ...

### 3 [Text summarization via hidden Markov models](#)

John M. Conroy, Dianne P. O'leary

September 2001 **Proceedings of the 24th annual international ACM SIGIR conference on Research and development in information retrieval**Full text available: [pdf\(133.10 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A sentence extract summary of a document is a subset of the document's sentences that contains the main ideas in the document. We present an approach to generating such summaries, a hidden Markov model that judges the likelihood that each sentence should be contained in the summary. We compare the results of this method with summaries generated by humans, showing that we obtain significantly higher agreement than do

earlier methods.

**Keywords:** automatic summarization, document summarization, extract summaries, hidden Markov models, text summarization

4 Envy-free auctions for digital goods

Andrew V. Goldberg, Jason D. Hartline

June 2003 **Proceedings of the 4th ACM conference on Electronic commerce**

Full text available:  pdf(169.88 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We study auctions for a commodity in unlimited supply, e.g., a digital good. In particular we consider three desirable properties for auctions: item Competitive: the auction achieves a constant fraction of the optimal revenue even on worst case inputs. item Truthful: any bidder's best strategy is to bid the maximum value they are willing to pay. item Envy-free: after the auction is run, no bidder would be happier with the outcome of another bidder (for digital good auctions, this means that ther ...

**Keywords:** auctions, competitive analysis

5 Predictive automatic relevance determination by expectation propagation

Yuan (Alan) Qi, Thomas P. Minka, Rosalind W. Picard, Zoubin Ghahramani

July 2004 **Twenty-first international conference on Machine learning**


Full text available:  pdf(314.64 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

In many real-world classification problems the input contains a large number of potentially irrelevant features. This paper proposes a new Bayesian framework for determining the relevance of input features. This approach extends one of the most successful Bayesian methods for feature selection and sparse learning, known as Automatic Relevance Determination (ARD). ARD finds the relevance of features by optimizing the model marginal likelihood, also known as the evidence. We show that this can lea ...

6 Research track papers: Interestingness of frequent itemsets using Bayesian networks as background knowledge

Szymon Jaroszewicz, Dan A. Simovici

August 2004 **Proceedings of the 2004 ACM SIGKDD international conference on Knowledge discovery and data mining**

Full text available:  pdf(191.90 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


The paper presents a method for pruning frequent itemsets based on background knowledge represented by a Bayesian network. The interestingness of an itemset is defined as the absolute difference between its support estimated from data and from the Bayesian network. Efficient algorithms are presented for finding interestingness of a collection of frequent itemsets, and for finding all attribute sets with a given minimum interestingness. Practical usefulness of the algorithms and their efficiency ...

**Keywords:** Bayesian network, association rule, background, frequent itemset, interestingness, knowledge

7 Measurements and testbeds: A framework for interpreting measurement over Internet

Kavé Salamatian, Serge Fdida

August 2003 **Proceedings of the ACM SIGCOMM workshop on Models, methods and tools for reproducible network research**

Full text available:  pdf(352.04 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper introduces a methodology for interpreting measurement obtained over Internet. The paper is motivated by the fact that a large number of published papers in empirical networking analysis follow a generic framework that might be formalized and generalized to a large class of problem. The objective of this paper is to present an interpretation framework and to illustrate it by examples coming from the networking literature. The aim of the paper is rather to give to the researcher who is ...

**Keywords:** Internet, Interpretation, Measurement, modelling

## 8 Learning with mixtures of trees

Marina Meila, Michael I. Jordan

September 2001 **The Journal of Machine Learning Research**, Volume 1

Full text available:  [pdf\(400.02 KB\)](#) Additional Information: [full citation](#), [abstract](#)

This paper describes the mixtures-of-trees model, a probabilistic model for discrete multidimensional domains. Mixtures-of-trees generalize the probabilistic trees of Chow and Liu (1968) in a different and complementary direction to that of Bayesian networks. We present efficient algorithms for learning mixtures-of-trees models in maximum likelihood and Bayesian frameworks. We also discuss additional efficiencies that can be obtained when data are "sparse," and we present data structures and alg ...

## 9 Approximately-strategyproof and tractable multi-unit auctions

Anshul Kothar, David C. Parke, Subhash Sur

June 2003 **Proceedings of the 4th ACM conference on Electronic commerce**

Full text available:  [pdf\(302.85 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present an approximately-efficient and approximately-strategyproof auction mechanism for a single-good multi-unit allocation problem. The bidding language in our auctions allows marginal-decreasing piecewise constant curves. First, we develop a fully polynomial-time approximation scheme for the multi-unit allocation problem, which computes a  $(1+\epsilon) \approx$  in worst-case time  $T = O(n^3/\epsilon)$ , given  $n$  bids each with a constant number of pieces. Second, we embed this approximation ...

**Keywords:** approximation algorithm, multi-unit auctions, strategyproof

## 10 Competitive solutions for online financial problems

Ran El-Yaniv

March 1998 **ACM Computing Surveys (CSUR)**, Volume 30 Issue 1

Full text available:  [pdf\(331.62 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This article surveys results concerning online algorithms for solving problems related to the management of money and other assets. In particular, the survey focuses on search, replacement, and portfolio selection problems

## 11 Parallel logic simulation of VLSI systems

Mary L. Bailey, Jack V. Briner, Roger D. Chamberlain

September 1994 **ACM Computing Surveys (CSUR)**, Volume 26 Issue 3

Full text available:  [pdf\(3.74 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Fast, efficient logic simulators are an essential tool in modern VLSI system design. Logic simulation is used extensively for design verification prior to fabrication, and as VLSI

systems grow in size, the execution time required by simulation is becoming more and more significant. Faster logic simulators will have an appreciable economic impact, speeding time to market while ensuring more thorough system design testing. One approach to this problem is to utilize parallel processing, taking ...

**Keywords:** circuit structure, parallel architecture, parallelism, partitioning, synchronization algorithm, timing granularity

## 12 Bayes point machines

Ralf Herbrich, Thore Graepel, Colin Campbell

September 2001 **The Journal of Machine Learning Research**, Volume 1

Full text available:  [pdf\(1.02 MB\)](#) Additional Information: [full citation](#), [abstract](#)

Kernel-classifiers comprise a powerful class of non-linear decision functions for binary classification. The support vector machine is an example of a learning algorithm for kernel classifiers that singles out the consistent classifier with the largest margin, i.e. minimal real-valued output on the training sample, within the set of consistent hypotheses, the so-called *version space*. We suggest the *Bayes point machine* as a well-founded improvement which approximates the Bayes-optimal ...

## 13 Sparse bayesian learning and the relevance vector machine

Michael E. Tipping

September 2001 **The Journal of Machine Learning Research**, Volume 1

Full text available:  [pdf\(999.88 KB\)](#) Additional Information: [full citation](#), [abstract](#)

This paper introduces a general Bayesian framework for obtaining sparse solutions to regression and classification tasks utilising models linear in the parameters. Although this framework is fully general, we illustrate our approach with a particular specialisation that we denote the 'relevance vector machine' (RVM), a model of identical functional form to the popular and state-of-the-art 'support vector machine' (SVM). We demonstrate that by exploiting a probabilistic Bayesian learning framework ...

## 14 Context-specific Bayesian clustering for gene expression data

Yoseph Barash, Nir Friedman

April 2001 **Proceedings of the fifth annual international conference on Computational biology**

Full text available:  [pdf\(233.32 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The recent growth in genomic data and measurement of genome-wide expression patterns allows to examine gene regulation by transcription factors using computational tools. In this work, we present a class of mathematical models that help in understanding the connections between transcription factors and functional classes of genes based on genetic and genomic data. These models represent the joint distribution of transcription factor binding sites and of expression levels of a gene in a single ...

## 15 Cost-benefit methodology for office systems

Peter G. Sassone

July 1987 **ACM Transactions on Information Systems (TOIS)**, Volume 5 Issue 3

Full text available:  [pdf\(1.27 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The time savings times salary (TSTS) approach is a widely used methodology for the financial justification of office information systems, yet its theoretical basis is largely unexplored. In this paper, we identify its underlying economic model, including five critical assumptions. We find that the model, though somewhat restrictive, is not unreasonable.

However, we find that the time-saving-times-salary calculation, per se, is implicitly based on a very particular assumptio ...

#### 16 Software metrics: roadmap

Norman E. Fenton, Martin Neil

May 2000 **Proceedings of the Conference on The Future of Software Engineering**

Full text available:  [pdf\(1.25 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** Bayesian belief nets, casual models, multi-criteria decision aid, risk assessment, software metrics

#### 17 Case-factor diagrams for structured probabilistic modeling

David McAllester, Michael Collins, Fernando Pereira

July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence**

Full text available:  [pdf\(405.79 KB\)](#)


Additional Information: [full citation](#), [abstract](#), [references](#)

We introduce a probabilistic formalism subsuming Markov random fields of bounded tree width and probabilistic context free grammars. Our models are based on a representation of Boolean formulas that we call case-factor diagrams (CFDs). CFDs are similar to binary decision diagrams (BDDs) but are concise for circuits of bounded tree width (unlike BDDs) and can concisely represent the set of parse trees over a given string under a given context free grammar (also unlike BDDs). A probabilistic mo ...

#### 18 Coalition formation: Coalition formation with uncertain heterogeneous information

Sarit Kraus, Onn Shehory, Gilad Taase

July 2003 **Proceedings of the second international joint conference on Autonomous agents and multiagent systems**

Full text available:  [pdf\(245.62 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


Coalition formation methods allow agents to join together and are thus necessary in cases where tasks can only be performed cooperatively by groups. This is the case in the Request For Proposal (RFP) domain, where some requester business agent issues an RFP - a complex task comprised of sub-tasks - and several service provider agents need to join together to address this RFP. In such environments the value of the RFP may be common knowledge, however the costs that an agent incurs for performing ...

**Keywords:** RFP, coalition formation, experimentation, incomplete information, task allocation

#### 19 Text categorization: Using asymmetric distributions to improve text classifier probability estimates

Paul N. Bennett

July 2003 **Proceedings of the 26th annual international ACM SIGIR conference on Research and development in informaion retrieval**

Full text available:  [pdf\(281.97 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Text classifiers that give probability estimates are more readily applicable in a variety of scenarios. For example, rather than choosing one set decision threshold, they can be used in a Bayesian risk model to issue a run-time decision which minimizes a user-specified cost function dynamically chosen at prediction time. However, the quality of the probability estimates is crucial. We review a variety of standard approaches to converting scores (and poor probability estimates) from text classifi ...



**Keywords:** active learning, classifier combination, cost-sensitive learning, text classification

## 20 When ignorance is bliss

Peter D. Grünwald, Joseph Y. Halpern

July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence**

Full text available:  [pdf\(333.33 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

It is commonly-accepted wisdom that more information is better, and that information should never be ignored. Here we argue, using both a Bayesian and a non-Bayesian analysis, that in some situations you are better off ignoring information if your uncertainty is represented by a set of probability measures. These include situations in which the information *is* relevant for the prediction task at hand. In the non-Bayesian analysis, we show how ignoring information avoids *d* ...

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## 21 [A new characterization of probabilities in Bayesian networks](#)

Lenhart K. Schubert

 July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence**

 Full text available: [pdf\(465.79 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

We characterize probabilities in Bayesian networks in terms of algebraic expressions called quasi-probabilities. These are arrived at by casting Bayesian networks as noisy AND-OR-NOT networks, and viewing the subnetworks that lead to a node as arguments for or against a node. Quasi-probabilities are in a sense the "natural" algebra of Bayesian networks: we can easily compute the marginal quasi-probability of any node recursively, in a compact form; and we can obtain the joint quasi-probability ...

## 22 [Cost benefit analysis of information systems: a survey of methodologies](#)

Peter G. Sassone

 April 1988 **ACM SIGOIS Bulletin , Conference Sponsored by ACM SIGOIS and IEEECS TC-OA on Office information systems**, Volume 9 Issue 2-3

 Full text available: [pdf\(999.47 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Cost justification has become one of the most important factors influencing the pace of business automation, particularly end user computing. The primary difficulty in cost justification is the evaluation of benefits. This paper identifies and discusses eight methodologies which have evolved to quantify the benefits of information systems. These are: decision analysis, cost displacement/avoidance, structural models, cost of effectiveness analysis, breakeven analysis, subjective anal ...

## 23 [Industry/government track papers: Learning to detect malicious executables in the wild](#)

Jeremy Z. Kolter, Marcus A. Maloof

 August 2004 **Proceedings of the 2004 ACM SIGKDD international conference on Knowledge discovery and data mining**

 Full text available: [pdf\(216.52 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we describe the development of a fielded application for detecting malicious executables in the wild. We gathered 1971 benign and 1651 malicious executables and encoded each as a training example using n-grams of byte codes as features. Such processing resulted in more than 255 million distinct n-grams. After selecting the most relevant n-grams for prediction, we evaluated a variety of inductive methods, including naive Bayes, decision trees, support vector machines, and boosting. ...

**Keywords:** concept learning, data mining, malicious software, security

**24** On inclusion-driven learning of bayesian networks

Robert Castelo, Tomás Kocka

December 2003 **The Journal of Machine Learning Research**, Volume 4


Full text available:  pdf(980.59 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Two or more Bayesian network structures are Markov equivalent when the corresponding acyclic digraphs encode the same set of conditional independencies. Therefore, the search space of Bayesian network structures may be organized in equivalence classes, where each of them represents a different set of conditional independencies. The collection of sets of conditional independencies obeys a partial order, the so-called "inclusion order." This paper discusses in depth the role that the inclusion ord ...

**25** KDD-99 conference reports: Profiling your customers using Bayesian networks

Paola Sebastiani, Marco Ramoni, Alexander Crea

January 2000 **ACM SIGKDD Explorations Newsletter**, Volume 1 Issue 2

Full text available:  pdf(1.22 MB) Additional Information: [full citation](#), [abstract](#)

This report describes a complete Knowledge Discovery session using Bayesware Discoverer, a program for the induction of Bayesian networks from incomplete data. We build two causal models to help an American Charitable Organization understand the characteristics of respondents to direct mail fund raising campaigns. The first model is a Bayesian network induced from the database of 96,376 Lapsed donors to the June '97 renewal mailing. The network describes the dependency of the probability of resp ...

**Keywords:** Bayesian networks, customer profiling, missing data

**26** An evaluation of statistical spam filtering techniques

Le Zhang, Jingbo Zhu, Tianshun Yao

December 2004 **ACM Transactions on Asian Language Information Processing (TALIP)**, Volume 3 Issue 4

Full text available:  pdf(343.64 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper evaluates five supervised learning methods in the context of statistical spam filtering. We study the impact of different feature pruning methods and feature set sizes on each learner's performance using cost-sensitive measures. It is observed that the significance of feature selection varies greatly from classifier to classifier. In particular, we found support vector machine, AdaBoost, and maximum entropy model are top performers in this evaluation, sharing similar characteristics: ...

**Keywords:** Spam filtering, text categorization

**27** An empirical evaluation of possible variations of lazy propagation

Anders L. Madsen

July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence**

Full text available:  pdf(383.90 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

As real-world Bayesian networks continue to grow larger and more complex, it is important to investigate the possibilities for improving the performance of existing algorithms of probabilistic inference. Motivated by examples, we investigate the dependency of the performance of Lazy propagation on the message computation algorithm.

We show how Symbolic Probabilistic Inference (SPI) and Arc-Reversal (AR) can be used for computation of clique to clique messages in the addition to the tra ...

**28** Propositional and relational Bayesian networks associated with imprecise and qualitative probabilistic assessments

Fabio Gagliardi Cozman, Cassio Polpo de Campos, Jaime Shinsuke Ide, José Carlos Ferreira da Rocha

July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence**

Full text available:  [pdf\(340.75 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper investigates a representation language with flexibility inspired by probabilistic logic and compactness inspired by relational Bayesian networks. The goal is to handle propositional and first-order constructs together with precise, imprecise, indeterminate and qualitative probabilistic assessments. The paper shows how this can be achieved through the theory of credal networks. New exact and approximate inference algorithms based on multilinear programming and iterated/loopy propaga ...

**29** Fast Binary Feature Selection with Conditional Mutual Information

François Fleuret

December 2004 **The Journal of Machine Learning Research**, Volume 5

Full text available:  [pdf\(211.52 KB\)](#) Additional Information: [full citation](#), [abstract](#)

We propose in this paper a very fast feature selection technique based on conditional mutual information. By picking features which maximize their mutual information with the class to predict conditional to any feature already picked, it ensures the selection of features which are both individually informative and two-by-two weakly dependant. We show that this feature selection method outperforms other classical algorithms, and that a naive Bayesian classifier built with features selected that w ...

**30** Learning Bayesian network classifiers by maximizing conditional likelihood

Daniel Grossman, Pedro Domingos

July 2004 **Twenty-first international conference on Machine learning**


Full text available:  [pdf\(187.23 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Bayesian networks are a powerful probabilistic representation, and their use for classification has received considerable attention. However, they tend to perform poorly when learned in the standard way. This is attributable to a mismatch between the objective function used (likelihood or a function thereof) and the goal of classification (maximizing accuracy or conditional likelihood). Unfortunately, the computational cost of optimizing structure and parameters for conditional likelihood is pro ...

**31** A proposal for valuing information and instrumental goods

Marshall V. Van Alstyne

January 1999 **Proceeding of the 20th international conference on Information Systems**

Full text available:  [pdf\(405.51 KB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

**32** Comparison of Bayesian and frequentist assessments of uncertainty for selecting the best system

Koichiro Inoue, Stephen E. Chick

December 1998 **Proceedings of the 30th conference on Winter simulation**

Full text available:  [pdf\(88.32 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**33** Common knowledge

John Geanakoplos

March 1992 **Proceedings of the 4th conference on Theoretical aspects of reasoning about knowledge**Full text available:  pdf(3.29 MB) Additional Information: [full citation](#), [abstract](#), [references](#)

People, no matter how rational they are, usually act on the basis of incomplete information. If they are rational they recognize their own ignorance and reflect carefully on what they know and what they do not know, before choosing how to act. Furthermore, when rational agents interact, they also think about what the others know, and what the others know about what they know, before choosing how to act. Failing to do so can be disastrous. When the notorious evil genius Professor Moriarty conf ...

**34** Research track papers: A Bayesian network framework for reject inference

Andrew Smith, Charles Elkan


August 2004 **Proceedings of the 2004 ACM SIGKDD international conference on Knowledge discovery and data mining**Full text available:  pdf(201.00 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Most learning methods assume that the training set is drawn randomly from the population to which the learned model is to be applied. However in many applications this assumption is invalid. For example, lending institutions create models of who is likely to repay a loan from training sets consisting of people in their records to whom loans were given in the past; however, the institution approved loan applications previously based on who was thought unlikely to default. Learning from only appro ...

**Keywords:** Bayesian networks, Heckman estimator, expectation-maximization, propensity scores, reject inference, sample selection bias

**35** Queries and aggregation: Cleaning and querying noisy sensors

Eiman Elnahrawy, Badri Nath

September 2003 **Proceedings of the 2nd ACM international conference on Wireless sensor networks and applications**Full text available:  pdf(256.08 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Sensor networks have become an important source of data with numerous applications in monitoring various real-life phenomena as well as industrial applications and traffic control. Unfortunately, sensor data is subject to several sources of errors such as noise from external sources, hardware noise, inaccuracies and imprecision, and various environmental effects. Such errors may seriously impact the answer to any query posed to the sensors. In particular, they may yield imprecise or even incorre ...

**Keywords:** bayesian theory, noisy sensors, query evaluation, statistics, uncertainty, wireless sensor networks

**36** An algorithm for the recovery of both target joint beliefs and full belief from Bayesian networks

Mark Bloemeke

April 1998 **Proceedings of the 36th annual Southeast regional conference**Full text available:  pdf(635.94 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

**37 Pac-bayesian generalisation error bounds for gaussian process classification**

Matthias Seeger

March 2003 **The Journal of Machine Learning Research**, Volume 3Full text available:  [pdf\(487.11 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Approximate Bayesian Gaussian process (GP) classification techniques are powerful non-parametric learning methods, similar in appearance and performance to support vector machines. Based on simple probabilistic models, they render interpretable results and can be embedded in Bayesian frameworks for model selection, feature selection, etc. In this paper, by applying the PAC-Bayesian theorem of McAllester (1999a), we prove distribution-free generalisation error bounds for a wide range of approxima ...

**Keywords:** Bayesian learning, Gaussian processes, Gibbs classifier, Kernel machines, PAC-Bayesian framework, convex duality, generalisation error bounds, sparse approximations

**38 Tractable learning of large Bayes net structures from sparse data**

Anna Goldenberg, Andrew Moore


July 2004 **Twenty-first international conference on Machine learning**Full text available:  [pdf\(127.86 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper addresses three questions. Is it useful to attempt to learn a Bayesian network structure with hundreds of thousands of nodes? How should such structure search proceed practically? The third question arises out of our approach to the second: how can Frequent Sets (Agrawal et al., 1993), which are extremely popular in the area of descriptive data mining, be turned into a probabilistic model? Large sparse datasets with hundreds of thousands of records and attributes appear in social netwo ...

**Keywords:** Bayes Net structure learning, Bayesian networks/graphical models, statistical learning

**39 Poster papers: Transforming classifier scores into accurate multiclass probability estimates**

Bianca Zadrozny, Charles Elkan

July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**Full text available:  [pdf\(690.25 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Class membership probability estimates are important for many applications of data mining in which classification outputs are combined with other sources of information for decision-making, such as example-dependent misclassification costs, the outputs of other classifiers, or domain knowledge. Previous calibration methods apply only to two-class problems. Here, we show how to obtain accurate probability estimates for multiclass problems by combining calibrated binary probability estimates. We a ...

**40 Model Averaging for Prediction with Discrete Bayesian Networks**

Denver Dash, Gregory F. Cooper

December 2004 **The Journal of Machine Learning Research**, Volume 5Full text available:  [pdf\(267.17 KB\)](#) Additional Information: [full citation](#), [abstract](#)

In this paper we consider the problem of performing Bayesian model-averaging over a class of discrete Bayesian network structures consistent with a partial ordering and with bounded in-degree  $k$ . We show that for  $N$  nodes this class contains in the worst-case at least  $\Omega(N^k)$  distinct network structures, and yet model averaging over these structures can be performed using

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#### 41 [Boosting as a Regularized Path to a Maximum-Margin Classifier](#)

Saharon Rosset, Ji Zhu, Trevor Hastie

 August 2004 **The Journal of Machine Learning Research**, Volume 5

 Full text available: [pdf\(553.71 KB\)](#) Additional Information: [full citation](#), [abstract](#)

In this paper we study boosting methods from a new perspective. We build on recent work by Efron et al. to show that boosting approximately (and in some cases exactly) minimizes its loss criterion with an  $l_1$  constraint on the coefficient vector. This helps understand the success of boosting with early stopping as regularized fitting of the loss criterion. For the two most commonly used criteria (exponential and binomial log-likelihood), we further show that as the constraint is ...

#### 42 [Book reviews](#)

Karen Sutherland

 June 2001 **intelligence**, Volume 12 Issue 2

 Full text available: [pdf\(358.84 KB\)](#)  
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#### 43 [Special issue on the fusion of domain knowledge with data for decision support: Fusion of domain knowledge with data for structural learning in object oriented domains](#)

Helge Langseth, Thomas D. Nielsen

 December 2003 **The Journal of Machine Learning Research**, Volume 4

 Full text available: [pdf\(227.18 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

When constructing a Bayesian network, it can be advantageous to employ structural learning algorithms to combine knowledge captured in databases with prior information provided by domain experts. Unfortunately, conventional learning algorithms do not easily incorporate prior information, if this information is too vague to be encoded as properties that are local to families of variables. For instance, conventional algorithms do not exploit prior information about repetitive structures, which are ...

#### 44 [On linear potential functions for approximating Bayesian computations](#)

Eugene Santos

 May 1996 **Journal of the ACM (JACM)**, Volume 43 Issue 3



Full text available:  pdf(1.95 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

Probabilistic reasoning suffers from NP-hard implementations. In particular, the amount of probabilistic information necessary to the computations is often overwhelming. For example, the size of conditional probability tables in Bayesian networks has long been a limiting factor in the general use of these networks. We present a new approach for manipulating the probabilistic information given. This approach avoids being overwhelmed by essentially compressing the information using ...

**Keywords:** artificial intelligence, data compaction and compression, integer programming, least squares approximation, pattern recognition, probabilistic reasoning, uncertainty

#### 45 [Learning and evaluating classifiers under sample selection bias](#)

Bianca Zadrozny

July 2004 **Twenty-first international conference on Machine learning**Full text available:  pdf(243.73 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

Classifier learning methods commonly assume that the training data consist of randomly drawn examples from the same distribution as the test examples about which the learned model is expected to make predictions. In many practical situations, however, this assumption is violated, in a problem known in econometrics as sample selection bias. In this paper, we formalize the sample selection bias problem in machine learning terms and study analytically and experimentally how a number of well-known c ...

#### 46 [Mini-buckets: A general scheme for bounded inference](#)

Rina Dechter, Irina Rish

March 2003 **Journal of the ACM (JACM)**, Volume 50 Issue 2Full text available:  pdf(902.27 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This article presents a class of approximation algorithms that extend the idea of bounded-complexity inference, inspired by successful constraint propagation algorithms, to probabilistic inference and combinatorial optimization. The idea is to bound the dimensionality of dependencies created by inference algorithms. This yields a parameterized scheme, called *mini-buckets*, that offers adjustable trade-off between accuracy and efficiency. The mini-bucket approach to optimization problems, s ...

**Keywords:** Accuracy/complexity trade-off, Bayesian networks, approximation algorithms, combinatorial optimization, probabilistic inference.

#### 47 [Oral presentation session IV: estimation and detection: Distributed state representation for tracking problems in sensor networks](#)

Juan Liu, Maurice Chu, Jie Liu, Jim Reich, Feng Zhao

April 2004 **Proceedings of the third international symposium on Information processing in sensor networks**Full text available:  pdf(266.46 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper investigates the problem of designing decentralized representations to support monitoring and inferences in sensor networks. State-space models of physical phenomena such as those arising from tracking multiple interacting targets, while commonly used in signal processing and control, suffer from the curse of dimensionality as the number of phenomena of interest increases. Furthermore, mapping an inference algorithm onto a distributed sensor network must appropriately allocate scarce ...

**Keywords:** ad hoc network, group collaboration, information, multi-target tracking, sensor network, target localization

48 Technical poster session 1: multimedia analysis, processing, and retrieval: A semi-naïve Bayesian method incorporating clustering with pair-wise constraints for auto image annotation

Wanjun Jin, Rui Shi, Tat-Seng Chua

October 2004 **Proceedings of the 12th annual ACM international conference on Multimedia**

Full text available:  pdf(258.93 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We propose a novel approach for auto image annotation. In our approach, we first perform the segmentation of images into regions, followed by clustering of regions, before learning the relationship between concepts and region clusters using the set of training images with pre-assigned concepts. The main focus of this paper is two-fold. First, in the learning stage, we perform clustering of regions into region clusters by incorporating pair-wise constraints which are derived by considering the ...

**Keywords:** image annotation, pair-wise constraint, semi-naïve Bayes, semi-supervised clustering

49 Greedy algorithms for classification—consistency, convergence rates, and adaptivity

Shie Mannor, Ron Meir, Tong Zhang

December 2003 **The Journal of Machine Learning Research**, Volume 4

Full text available:  pdf(269.33 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Many regression and classification algorithms proposed over the years can be described as greedy procedures for the stagewise minimization of an appropriate cost function. Some examples include additive models, matching pursuit, and boosting. In this work we focus on the classification problem, for which many recent algorithms have been proposed and applied successfully. For a specific regularized form of greedy stagewise optimization, we prove consistency of the approach under rather general co ...

50 Advanced tutorials: Bayesian methods: bayesian methods for simulation

Stephen E. Chick

December 2000 **Proceedings of the 32nd conference on Winter simulation**

Full text available:  pdf(113.00 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

This tutorial describes some ways that Bayesian methods address problems that arise during simulation studies. This includes quantifying uncertainty about input distributions and parameters, sensitivity analysis, and the selection of the best of several simulated alternatives. Focus is on illustrating the main ideas and their relevance to practical problems. Numerous citations for both introductory and more advanced material provide a launching pad into the Bayesian literature.

51 Mechanisms for coalition formation and cost sharing in an electronic marketplace

Cuihong Li, Uday Rajan, Shuchi Chawla, Katia Sycara

September 2003 **Proceedings of the 5th international conference on Electronic commerce**

Full text available:  pdf(237.54 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper we study the mechanism design problem of coalition formation and cost sharing in an electronic marketplace, where buyers can form coalitions to take advantage of discounts based on volume. The desirable mechanism properties include stability (being in

the core), and incentive compatibility with good efficiency, concepts from the perspectives of cooperative and non-cooperative game theory. We first analyze the problem from both these perspectives. We show the impossibility to simulta ...

**52** Sequential allocations that reduce risk for multiple comparisons

Stephen E. Chick, Koichiro Inoue

December 1998 **Proceedings of the 30th conference on Winter simulation**

Full text available:  pdf(116.47 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



**53** Technical correspondence

CORPORATE Tech Correspondence

November 1985 **Communications of the ACM**, Volume 28 Issue 11


Full text available:  pdf(1.03 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



**54** An empirical evaluation of several methods to select the best system

Koichiro Inoue, Stephen E. Chick, Chun-Hung Chen

October 1999 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**,  
Volume 9 Issue 4

Full text available:  pdf(199.74 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)



Simulation is an important tool for comparing the performance of several alternative systems. There is therefore significant interest in procedures that efficiently select the best system, where best is defined by the maximum or minimum expected simulation output. In this paper, we examine both two-stage and sequential procedures that represent three structurally different modeling methodologies for allocating simulation replications to identify the best system, and we evaluate them empiric ...

**Keywords:** discrete-event simulation, multiple selection procedures, ranking and selection

**55** The Advantages of Compromising in Coalition Formation with Incomplete Information

Sarit Kraus, Onn Shehory, Gilad Taase

July 2004 **Proceedings of the Third International Joint Conference on Autonomous Agents and Multiagent Systems - Volume 2**

Full text available:  pdf(338.65 KB) Additional Information: [full citation](#), [abstract](#), [index terms](#)




This paper presents protocols and strategies for coalition formation with incomplete information under time constraints. It focuses on strategies for coalition members to distribute revenues amongst themselves. Such strategies should preferably be stable, lead to a fair distribution, and maximize the social welfare of the agents. These properties are only partially supported by existing coalition formation mechanisms. In particular, stability and the maximization of social welfare are supported ...

**56** Selectivity estimation using probabilistic models

Lise Getoor, Benjamin Taskar, Daphne Koller

May 2001 **ACM SIGMOD Record , Proceedings of the 2001 ACM SIGMOD international conference on Management of data**, Volume 30 Issue 2

Full text available:  pdf(525.74 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)



Estimating the result size of complex queries that involve selection on multiple attributes and the join of several relations is a difficult but fundamental task in database query

processing. It arises in cost-based query optimization, query profiling, and approximate query answering. In this paper, we show how probabilistic graphical models can be effectively used for this task as an accurate and compact approximation of the joint frequency distribution of multiple attributes across multiple ...

### 57 Robust probabilistic inference in distributed systems

Mark A. Paskin, Carlos E. Guestrin

July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence**

Full text available:  [pdf\(524.33 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Probabilistic inference problems arise naturally in distributed systems such as sensor networks and teams of mobile robots. Inference algorithms that use message passing are a natural fit for distributed systems, but they must be robust to the failure situations that arise in real-world settings, such as unreliable communication and node failures. Unfortunately, the popular sum-product algorithm can yield very poor estimates in these settings because the nodes' beliefs before convergence can ...

### 58 Session 2: An economic answer to unsolicited communication

Thede Loder, Marshall Van Alstyne, Rick Wash

May 2004 **Proceedings of the 5th ACM conference on Electronic commerce**

Full text available:  [pdf\(352.80 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


We explore an alternative approach to spam based on economic rather than technological or regulatory screening mechanisms. We employ a model of email value which supports two intuitive notions: 1) mechanisms designed to promote valuable communication can often outperform those designed merely to block wasteful communication, and 2) designers of such mechanisms should shift focus away from the information in the message to the information known to the sender. We then use principles of informatio ...

**Keywords:** filtering, information asymmetry, mechanism design, screening, signaling, spam, uce

### 59 Special issue on learning from imbalanced datasets: Minority report in fraud detection: classification of skewed data

Clifton Phua, Daminda Alahakoon, Vincent Lee

June 2004 **ACM SIGKDD Explorations Newsletter**, Volume 6 Issue 1

Full text available:  [pdf\(262.38 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)


This paper proposes an innovative fraud detection method, built upon existing fraud detection research and *Minority Report*, to deal with the data mining problem of skewed data distributions. This method uses backpropagation (BP), together with naive Bayesian (NB) and C4.5 algorithms, on data partitions derived from minority oversampling with replacement. Its originality lies in the use of a single meta-classifier (stacking) to choose the best base classifiers, and then combine these base ...

**Keywords:** fraud detection, meta-learning, multiple classifier systems

### 60 Information access and retrieval: Evaluating cost-sensitive Unsolicited Bulk Email categorization

José María Gómez Hidalgo

March 2002 **Proceedings of the 2002 ACM symposium on Applied computing**

Full text available:  [pdf\(566.16 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In the recent years, Unsolicited Bulk Email has become an increasingly important problem, with a big economic impact. In this paper, we discuss cost-sensitive Text Categorization methods for UBE filtering. In concrete, we have evaluated a range of Machine Learning methods for the task (C4.5, Naive Bayes, PART, Support Vector Machines and Rocchio), made cost sensitive through several methods (Threshold Optimization, Instance Weighting, and Meta-Cost). We have used the Receiver Operating Character ...

**Keywords:** cost-sensitive classification, evaluation, text categorization, unsolicited bulk email

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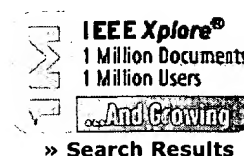
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**1 Bayesian Nash equilibrium bidding strategies for generation companies**
*Debin Fang; Xianjia Wang; Fangrui Ouyang; Chun Ye;*

Electric Utility Deregulation, Restructuring and Power Technologies, 2004. (DRPT 2004). Proceedings of the 2004 IEEE International Conference on , Volume: 2 , 5-8 April 2004

Pages:692 - 697 Vol.2

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*Jacovitti, G.; Neri, A.;*

Spectrum Estimation and Modeling, 1990., Fifth ASSP Workshop on , 10-12 Oct. 1990

Pages:79 - 83

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**3 Bayesian optimization algorithm for multi-objective solutions: application to electric equipment configuration problems in a power plant**
*Katsumata, Y.; Terano, T.;*

Evolutionary Computation, 2003. CEC '03. The 2003 Congress on , Volume: 2 , 8-12 Dec. 2003

Pages:1101 - 1107 Vol.2

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**4 The MPM-MAP algorithm for image segmentation**
*Marroquin, J.L.; Botello, S.; Calderon, F.; Vemuri, B.C.;*

Pattern Recognition, 2000. Proceedings. 15th International Conference on , Volume: 1 , 3-7 Sept. 2000

Pages:303 - 308 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(588 KB\)\]](#) [IEEE CNF](#)

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**5 Fault analysis and prediction in telecommunication access network**

*Medved, D.; Brlas, K.; Saric, D.;*

Electrotechnical Conference, 2000. MELECON 2000. 10th Mediterranean , Volume: 1 , 29-31 May 2000

Pages:136 - 139 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(432 KB\)\]](#) [IEEE CNF](#)

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**6 Exploiting group structure to improve retrieval accuracy and speed in image databases**

*Vasconcelos, N.;*

Image Processing. 2002. Proceedings. 2002 International Conference on , Volume: 1 , 22-25 Sept. 2002

Pages:I-980 - I-983 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(344 KB\)\]](#) [IEEE CNF](#)

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**7 A Bayesian marginalization approach for improved EEG dipole localization**

*Radich, B.M.; Buckley, K.M.;*

Signals, Systems and Computers, 1994. 1994 Conference Record of the Twenty-Eighth Asilomar Conference on , Volume: 2 , 31 Oct.-2 Nov. 1994


Pages:796 - 800 vol.2

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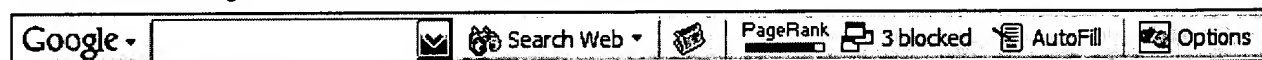
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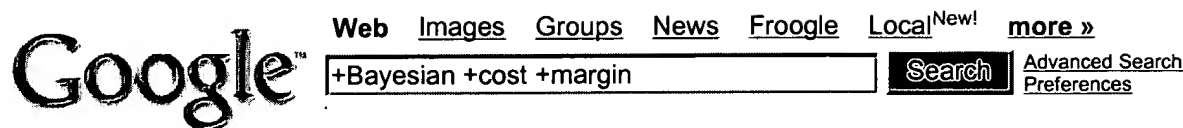


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[PDF] **Bayesian Analysis of Simultaneous Demand and Supply**

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marginal **cost**, and  $f \frac{1}{4} 1$  or 0. If  $f \frac{1}{4} 1$ , then manufacturers are involved in tacit collusion. ... 810P **BAYESIAN ANALYSIS OF SIMULTANEOUS DEMAND AND SUPPLY** 255 ...

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Generalized inner product/cosine. Max **margin cost** function. Specifying assumptions.

**Bayesian** learning assumes: Data were generated by some stochastic process.

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... Generalized inner product/cosine • Max **margin cost** function Page 7. Specifying assumptions • **Bayesian** learning assumes: • Data ...

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**Thore Graepel - Journal Articles**

The result is obtained in a PAC-**Bayesian** framework and is ..... In the soft-boundary/soft-**margin** case, the improvement .... The TMP **cost** function is derived in a Bayesian ...

research.microsoft.com/~thore/g/ bibpages/html/articles-abstracts.html - 14k - [Cached](#) - [Similar pages](#)

**The Liberal Order: The Cost of Deleting Spam**

... was conducted in November and has a **margin** of sampling .... m surprised that you missed the real **cost** of spam .... **Bayesian** filters, by the way, simply move the problem ...

liberalorder.typepad.com/the\_liberal\_order/ 2005/02/the\_cost\_of\_del.html - 19k - [Cached](#) - [Similar pages](#)

**Bayesian Estimation web**

This strategy obviously gives a comfortable **margin** of safety but is ... weather phenomena in order to reduce the production **cost**". Benefits of the **Bayesian** choice.

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Soft **margin** loss function is special in that it gives identical zero ... training samples are not involved in the **Bayesian** inference computations. This sim- ...

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... the market that have issued traded debt, the debt **margin** can be ..... using five years of monthly data, and incorporating a **Bayesian** adjustment ... **Cost** of Equity Inputs ...

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**Carlos Guestrin's Research Page**

... problem-specific structure using **Bayesian** networks, we .... that minimize the expected **cost** for answering a ... Maximum **margin** classification in structured domains: we ...

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**Cost** volume profit, breakeven , contribution **margin**, opportunity costs ...

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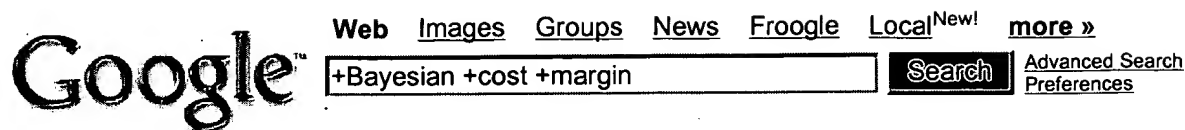
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### [Antispam] Paul Graham's Better **Bayesian** paper

But it increases the **cost** per new spam, and (consequently) decreases the spammer's profit **margin**. ... But for the time being **Bayesian** filters are more the ...

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... the Pareto frontier in the construction **cost** versus expected ... and a good (close to optimal) **margin** selection can ... Finally, a **Bayesian** approach is suggested, when ...

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In particular **Bayesian** evidence can be analysed within the ... and a relation developed between **margin** analysis and .... mainly in the choice of the **cost** function where ...

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Optimal parameters can then be inferred by **Bayesian** tech- niques with the benefit of .... step function in classical SVC is also called hard **margin** loss function ...

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... time on the EMS computers at the **cost** of other ..... criteria is called the loading **margin** to frequency .... ANN based on Levenberg- Marquardt and **Bayesian** Regulation back ...

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... breaks in the Lerner Index (price-**cost margin**) and their ..... Index is constructed using marginal **cost** estimates and ..... Sequential), the **Bayesian** Information Criterion ...

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Using these data and some reasonable assumptions (discussed shortly), we estimate the acquisition **cost** and quarterly **margin** per customer.

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### [PDF] **The Bayesian Committee Support Vector Machine**

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... soft **margin**) but  $\sigma = 2$  (2-norm soft **margin**) is also .... 5 The **Bayesian** Committee Support

Vector Machine (BC-SVM ... derived from the Hessian matrix of the **cost** function ...  
[www.brauer.informatik.tu-muenchen.de/~trespvol/papers/icannsvm\\_final.pdf](http://www.brauer.informatik.tu-muenchen.de/~trespvol/papers/icannsvm_final.pdf) - [Similar pages](#)

[PDF] **Bayesian** Conditional Random Fields

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Applying the **Bayesian** framework brings principled solutions and tools for addressing overfitting ... Unlike ML, MAP, or large-**margin** approaches, we train BCRFs by ...

[people.csail.mit.edu/u/a/alanqi/public\\_html/papers/Qi-Bayesian-CRF-Alstat05.pdf](http://people.csail.mit.edu/u/a/alanqi/public_html/papers/Qi-Bayesian-CRF-Alstat05.pdf) - [Similar pages](#)

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